The documentation and process conversion measures necessary to comply with this revision shall be completed by 20 May 2016.

INCH–POUND

MIL–PRF–19500/199E
19 February 2016
SUPERSEDING
MIL–PRF–19500/199D
14 August 2006

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, DIODE, SILICON, FORWARD-VOLTAGE REGULATOR, AXIAL LEADED ROUND BODY PACKAGE, TYPE 1N816, QUALITY LEVEL JAN

MIL–PRF–19500/199 is inactive for new design as of 7 June 1999.

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and MIL–PRF–19500.

1. SCOPE

1.1 Scope. This specification covers the performance requirements for silicon, forward-voltage regulator diode, with a nominal forward-voltage drop of 0.64 V dc at 1 mA dc. One level of product assurance (JAN) is provided for the device type as specified in MIL–PRF–19500.

1.2 Package outline. The device package outline is similar to a DO–204AA and DO–204AH (formerly DO–7 and DO–35) in accordance with figure 1 for all encapsulated device types.

1.3 Maximum ratings.

V_r	$V_{RM(wkg)}$	I_F	$I_{f(surge)}$ 1/120 sec	T_J	T_{STG}
V(pk)	V(pk)	mA dc	mA dc		
10	6	150	500	–65°C to +150°C	–65°C to +175°C

$R_{\theta JL}$ = 250°C/W (maximum) at L = .375 inch (9.53 mm) mounting conditions.
$R_{\theta JA}$ = 300°C/W. Junction to ambient including PCB.

1.4 Primary electrical characteristics. Not applicable.

Comments, suggestions, or questions on this document should be addressed to DLA Land and Maritime, ATTN: VAC, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to Semiconductor@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.dla.mil.

1.5 Part or Identifying Number (PIN). The PIN is in accordance with MIL–PRF–19500, and as specified herein. See 6.4 for PIN construction example and 6.5 for a list of available PINs.

1.5.1 JAN certification mark and quality level. The JAN certification mark and only quality level designator for encapsulated devices that is applicable for this specification sheet is the base quality level "JAN".

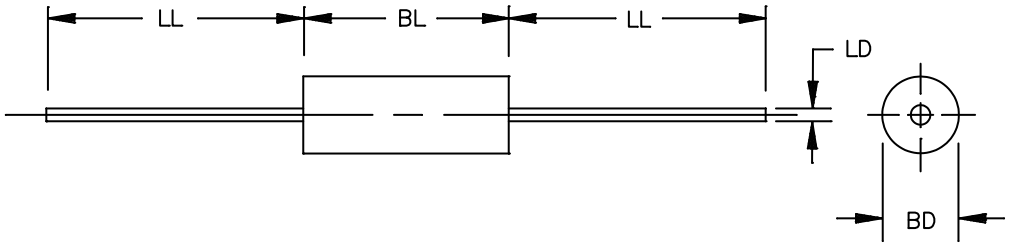
1.5.2 Device type. The designation system for the device types of diodes covered by this specification sheet are as follows.

1.5.2.1 First number and first letter symbols. The diodes of this specification sheet use the first number and letter symbols "1N".

1.5.2.2 Second number symbols. The second number symbols for the diodes covered by this specification sheet are as follows: "816".

1.5.3 Suffix symbols. Suffix symbols are not applicable to this specification sheet.

1.5.4 Lead finish. The lead finishes applicable to this specification sheet are listed on QPDSIS–19500.



Package outline	Symbol	Dimensions			
		Inches		Millimeters	
		Min	Max	Min	Max
DO–204AH	BD	.056	.075	1.42	1.91
	BL	.140	.180	3.56	4.57
	LD	.018	.022	0.46	0.56
	LL	1.000	1.500	25.40	38.10
DO–204AA	BD	.078	.107	1.98	2.72
	BL	.195	.300	4.95	7.62
	LD	.018	.022	0.46	0.56
	LL	1.000	1.500	25.40	38.10

NOTES:
1. Dimensions are in inches. Millimeters are given for general information only.-
2. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

FIGURE 1. Physical dimensions of DO–204AA and DO–204AH (formerly DO–7, DO–35) package.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL–PRF–19500 – Semiconductor Devices, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL–STD–750 – Test Methods for Semiconductor Devices.

(Copies of these documents are available online at http://quicksearch.dla.mil.)

2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 General. The individual item requirements shall be as specified in MIL–PRF–19500 and as modified herein.

3.2 Qualification. Devices furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturers list before contract award (see 4.2 and 6.3).

3.3 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL–PRF–19500.

3.4 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL–PRF–19500, and on figure 1.

3.4.1 Lead finish. The lead finish shall be solderable in accordance with MIL–PRF–19500, MIL–STD–750, and herein. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).

3.4.2 Diode construction. All devices shall be of a metallurgically bonded double plug construction in accordance with the requirements of category I, II, or III of MIL–PRF–19500.

3.5 Marking. Marking shall be in accordance with MIL–PRF–19500.

3.5.1 Polarity. The polarity shall be indicated with a contrasting color band to denote the cathode end. No color coding will be permitted.

3.6 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in 1.3 and table I.

3.7 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table I.

3.8 Workmanship. Devices shall be processed in such a manner as to be uniform in quality and shall be free from other defects that will affect life, serviceability, or appearance.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (see 4.2).

b. Conformance inspection (see 4.4).

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL–PRF–19500 and as specified herein.

4.2.1 Group E qualification. Group E inspection shall be performed for qualification or re-qualification only. In case qualification was awarded to a prior revision of the specification sheet that did not request the performance of table II tests, the tests specified in table II herein that were not performed in the prior revision shall be performed on the first inspection lot of this revision to maintain qualification.

4.3 Screening. Screening is not required for devices compliant to this specification sheet.

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL–PRF–19500 and as specified herein.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL–PRF–19500 and table I herein. End-point electrical measurements shall be in accordance with table I, subgroup 2 herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the tests and conditions specified for subgroup testing in table E–VIB of MIL–PRF–19500 and as follows.

Subgroup	Method	Conditions
B3	1027	I_f = 150 mA dc, V_{RWM} = 6 V (pk) (see 4.5.2).
B5		Not applicable.

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the tests and conditions specified for subgroup testing in table E–VII of MIL–PRF–19500 and as follows. End-point electrical measurements shall be in accordance with the table I, subgroup 2 herein.

Subgroup	Method	Conditions
C2	2036	Lead fatigue: Test condition E.
C5	4081	L = .375 inch (9.53 mm), $R_{\Theta JL}$ = 250°C/W maximum; 22 devices, c = 0.
C6	1026	I_f = 150 mA dc, V_{RWM} = 6 V (pk) (see 4.5.2).

4.4.4 Group E inspection. Group E inspection shall be conducted in accordance with the tests and conditions specified for subgroup testing in table E–IX of MIL–PRF–19500 and table II herein. End-point electrical measurements shall be in accordance with table I, subgroup 2 herein.

4.5 Methods of inspection. Methods of inspection shall be as specified in table I, and as follows.

4.5.1 Pulse response measurements. The conditions for pulse response measurement shall be as specified in section 4 of MIL–STD–750.

4.5.2 Steady-state operation life. The steady-state operation life test shall be performed in accordance with test method 1027 (for group B) or 1026 (for group C) of MIL–STD–750. This test shall be conducted with a half-sine wave form of the specified peak voltage impressed across the diode in the reverse direction followed by a half-sine wave form of the specified average rectifier current. The forward conduction angle of the rectified current shall not be greater than 180 degrees nor less than 150 degrees, and the power shall be equal to or greater than that of a half-sine wave.

4.5.3 Surge current. The surge current test shall be performed in accordance with condition A1 of test method 4066 of MIL–STD–750. The surge current ($I_{f(surge)}$) of 500 mA dc shall be applied in the forward direction and shall be superimposed on the current (I_O = 150 mA dc) a total of ten surges at 1 minute intervals. Each individual surge shall be a square wave pulse of 1/120 second duration or an equivalent one half sine wave with the same effective (rms) current.

4.5.4 Thermal impedance measurements. Thermal impedance measurements shall be performed in accordance with method 3101 of MIL–STD–750.

TABLE I. Group A inspection.

Inspection 1/	MIL–STD–750		Symbol	Limit		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical examination	2071					
Subgroup 2						
Thermal impedance	3101	See 4.5.4	$Z_{\theta JX}$		70	°C/W
Forward voltage	4011	Condition A; I_F = 1.0 mA dc	V_{F1}	.576	.704	V dc
Forward voltage	4011	Condition A; I_F = 100 mA dc	V_{F2}		1.0	V dc
Dynamic resistance		I_F = 1.0 mA dc; I_{AC} = 0.1 mA (rms); f = 60 Hz	R		50	ohms
Reverse current leakage (at peak reverse voltage)	4016	DC method, V_R = 10 V (pk)	I_{R1}		10	µA (pk)
Reverse current leakage	4016	DC method, V_R = 6 V dc	I_{R2}		100	nA dc
Subgroup 3						
High temperature operation:		T_A = +150°C				
Reverse current leakage	4016	DC method, V_R = 6 V dc	I_{R3}		10	µA dc
Low temperature operation:		T_A = –55°C				
Forward voltage	4011	Condition B; I_F = 100 mA (pk), pulsed; t_p = 8.5 ms (maximum), duty cycle ≤ 2 percent.	V_{F3}		1.2	V dc
Subgroups 4 and 5						
Not applicable						
Subgroup 6						
Surge current	4066	Condition A1; (see 4.5.3) I_O = 150 mA dc; T_A = 25°C, I_{FSM} = 500 ma (pk), ten 1 µs surges, 1 surge/minute				
End-point electrical measurements		See table I, subgroup 2				

1/ For sampling plan see MIL–PRF–19500.

TABLE II. Group E inspection (all quality levels) for qualification and requalification only.

Inspection	MIL–STD–750		Sample plan
	Method	Conditions	
Subgroup 1			45 devices c = 0
Thermal shock (glass strain)	1056	100 cycles 0°C to 100°C	
Temperature cycling (air to air)	1051	Test condition C, 500 cycles, –65°C to +175°C	
Hermetic seal	1071	Gross leak only.	
End-point electrical measurements		See table I, subgroup 2 herein.	
Subgroup 2			
Intermittent operating life	1037	10,000 cycles.	
End-point electrical measurements		See table I, subgroup 2 herein.	
Subgroup 4			Sample size N/A
Thermal impedance curves		See MIL–PRF–19500.	
Subgroup 5			
Not applicable			
Subgroup 6			11 devices
ESD	1020		
Subgroup 9			45 devices
Resistance to glass cracking	1057	Test condition B. Test until failure occurs or to a maximum of 25 cycles, whichever comes first.	
Subgroup 10			22 devices c = 0
Monitored mission temperature cycling	1055		
End-point electrical measurements		See table I, subgroup 2 herein.	

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the Military Service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.) The notes specified in MIL–PRF–19500 are applicable to this specification.)

6.1 Intended use. Semiconductors conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.

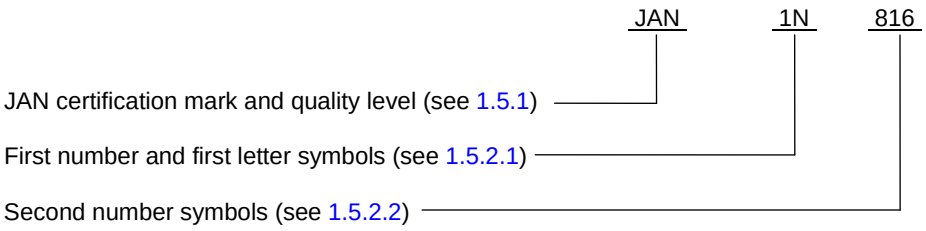
b. Packaging requirements (see 5.1).

c. Lead finish (see 3.4.1).

d. The complete PIN, see 1.5 and 6.4.

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List (QML-19500) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DLA Land and Maritime, ATTN: VQE, P.O. Box 3990, Columbus, OH 43218-3990 or e-mail vqe.chief@dla.mil.

6.4 PIN construction example. The PINs for encapsulated devices are constructed using the following form.



6.5 List of PINs. The only PIN available on this specification sheet is JAN1N816.

6.6 Changes from previous issue. The margins of this specification are marked with vertical lines to indicate modifications generated by this amendment. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

Custodians:
Army – CR
Navy – EC
Air Force – 85
DLA – CC

Preparing activity:
DLA – CC

(Project 5961–2015–100)

Review activities:
Army – AR, SM
Navy – AS, MC, OS, SH
Air Force – 19, 70, 99

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at https://assist.dla.mil.